Notes on the Groupers of Tahiti, with Description of a New Serranid Fish Genus[1]

JOHN E. RANDALL

DURING 1956 and part of 1957 the author carried out research on the biology of groupers (Epinephelinae; Serranidae) and snappers (Lutjanidae) in the Society Islands, with the support of a fellowship from Yale University and the Bernice P. Bishop Museum. The following 12 species of groupers were discussed in a paper by Randall and Brock (1960) which dealt primarily with food habits of Tahitian fishes:

Epinephelus merra Bloch
Epinephelus hexagonatus (Bloch and Schneider)
Epinephelus fuscoguttatus (Forskål)
Epinephelus elongatus Schultz
Epinephelus fasciatus (Forskål)
Cephalopholis argus (Bloch and Schneider)
Cephalopholis urodelus (Bloch and Schneider)
Cephalopholis miniatus (Forskål)
Cephalopholis leopardus (Lacépède)
Variola louti (Forskål)
Plectropomus leopardus (Lacépède)
Plectropomus maculatus (Bloch)

In addition to the above, a few specimens of four rare groupers were collected which were not positively identified in the field. Considerable museum research was needed to identify these fishes, one of which does not fit into either of two genera in which it has been previously classified. Further study has necessitated the alteration of the names of two of the more common groupers in the list of 12, *Epinephelus fuscoguttatus* and *Epinephelus elongatus*. Discussions of the four rare species and the two name changes are presented under separate headings below.

Most museum work was carried out at the U.S. National Museum (USNM), with the assistance of Leonard P. Schultz and others of the Division of Fishes. Dorothea B. Schultz made the drawing of *Epinephelus truncatus* Katayama.

STATUS OF *Cephalopholis albomarginatus*

After considerable effort a serranid fish unknown to the author, which was sighted underwater on several occasions in the Tuamotu Archipelago, was finally collected at Tetiaroa atoll in the Society Islands, near Tahiti. It was ultimately identified as *Cephalopholis albomarginatus* Fowler and Bean (1930). The specimen was deposited in the collection of the George Vanderbilt Foundation at Stanford University.

The species has been recorded on only two occasions since the original description of East Indian and Philippine specimens, once from East Africa (Smith, 1954) and once from Aldabra in the Indian Ocean (Smith, 1955); thus a record from the Society Islands represents a noteworthy range extension.

Smith elevated the subgenus *Aethaloperca* Fowler (1904), the type species of which is *Perca rogaa* Forskål, to generic rank and included *albomarginata*. Although not properly belonging in *Cephalopholis, albomarginata* fits no better in *Aethaloperca;* therefore a new genus is proposed for this fish.

Gracila, n. gen.

DIAGNOSIS. One dorsal fin with nine spines; spines of fins slender; supramaxillary bone present; depressible teeth in jaws, those at side of lower jaw in a single row medial to a row of fixed teeth; a single pair of enlarged canine teeth at front of each jaw; head small, the length about 3.1 in standard length; depth about 2.6 in standard length; caudal fin emarginate.

DESCRIPTION. Dorsal rays IX, 15; anal rays III, 9 (rarely 10); dorsal and anal spines mod-

[1] Contribution from the Institute of Marine Biology, University of Puerto Rico, Mayaguez, Puerto Rico. Manuscript received August 25, 1963.

erately slender; dorsal fin unnotched, the spinous portion of fin equal in basal length to soft portion; body compressed, the width about 2 in head length and 6.5–7 in standard length; head small, about 3.1 in standard length; body depth moderate, about 2.6 in standard length; supramaxillary (supplemental) bone present; mouth moderately large, the maxillary extending slightly posterior to eye; a pair of enlarged canine teeth anteriorly in each jaw separated by a broad gap (two adjacent canines may be present in place of a single canine), and a single row of smaller canines on sides of jaws; depressible canine teeth medial to anterior canines and in one medial row on side of lower jaw; upper jaw with a band of villiform teeth medial to fixed canines at side of jaw; a band of villiform teeth on palatines and on vomer (in V-shape on latter); tongue smooth; opercle with three flat spines, middle one closest to lower; edge of preopercle rounded with only a slight indentation above angle; upper preopercular margin finely serrate, lower margin smooth; margin of interopercle and subopercle finely serrate; head, including maxillary, scaled; scales moderately small (about 110 vertical rows between upper end of gill opening and end of hypural); scales ctenoid except on head, thorax, abdomen, and anterodorsally on body; lateral line single, continuous to base of caudal; posterior nostrils spherical; pectoral fins obtusely pointed; caudal fin emarginate; gill rakers moderately long; the one at angle slightly longer than gill filaments; 24 vertebrae.

Monotypic. Type species, *Cephalopholis albomarginatus* Fowler and Bean.

DISCUSSION. *Gracila* shows affinities to *Cephalopholis* but differs principally in external morphology in its smaller head (head length of *Cephalopholis* 2.4–2.7 in standard length) and emarginate caudal fin (caudal always rounded in *Cephalopholis*). It also displays a different mode of life from *Cephalopholis;* it characteristically swims well above the bottom like species of *Plectropomus. Cephalopholis* dwells more upon the bottom and is more retiring in its habits. *Gracila* differs notably from *Plectropomus* in having 9 instead of 6–8 dorsal spines and in lacking enlarged canines of the side of the lower jaw.

Gracila is also closely related to *Aethaloperca.* The latter is distinctive in the steep dorsal profile of the head (the snout forms an angle of nearly 60 degrees to the horizontal; the snout angle of *Gracila* is about 40 degrees) and its deep body (depth about 2.2 in standard length). Also, the teeth at the side of the lower jaw of *Aethaloperca* (and most species of *Cephalopholis*) occur in more than two rows (except posteriorly on the jaw); in *Gracila* there are only two rows of teeth, the outer fixed and the inner depressible. Also, *Gracila* has much smaller anal spines.

Gracila albomarginata

Figs. 1, 2

Cephalopholis albomarginatus Fowler and Bean, 1930. Bull. U.S. Natl. Mus. 100, p. 235, fig. 11 (type locality: Danawan Island, vicinity of Sibuko Bay, Borneo).

Aethaloperca albomarginata: Smith, 1954. Ann. Mag. Nat. Hist., ser. 12, vol. 7, p. 925, pl. 33 A (first record from Indian Ocean).

One specimen: 257 mm standard length, 318 mm total length, Tetiaroa, Society Islands, Feb. 16, 1957, J. E. Randall. Natural History Museum, Stanford University, uncatalogued.

The following counts, measurements, and observations were made from the fresh specimen: dorsal rays IX, 15; anal rays III, 9; pectoral rays 19; lateral-line scales about 115; head length 82 mm; body depth 87 mm; body width 48 mm; least depth of caudal peduncle 33 mm; diameter of eye 14.5 mm; interorbital space 18.5 mm; length of pectoral fin 52 mm; lower jaw projects 5 mm beyond upper jaw when mouth is closed; caudal concavity 13 mm; three spines on opercle, the middle located about one-third distance from lower to upper spine; preopercle entire, rounded, the upper limb finely serrate; four canine teeth in lower jaw in two close-set pairs, separated by a 5 mm gap at symphysis; teeth in upper jaw similar (only one canine on one side), separated by 11 mm; remaining teeth nearly as long, more slender, depressible, and in a double row; narrow band of villiform teeth on vomer and palatines.

Color in life reddish brown with a suffusion of orange on head, especially around mouth; numerous light grayish-blue bars on sides which nearly disappear in preservative; four diagonal

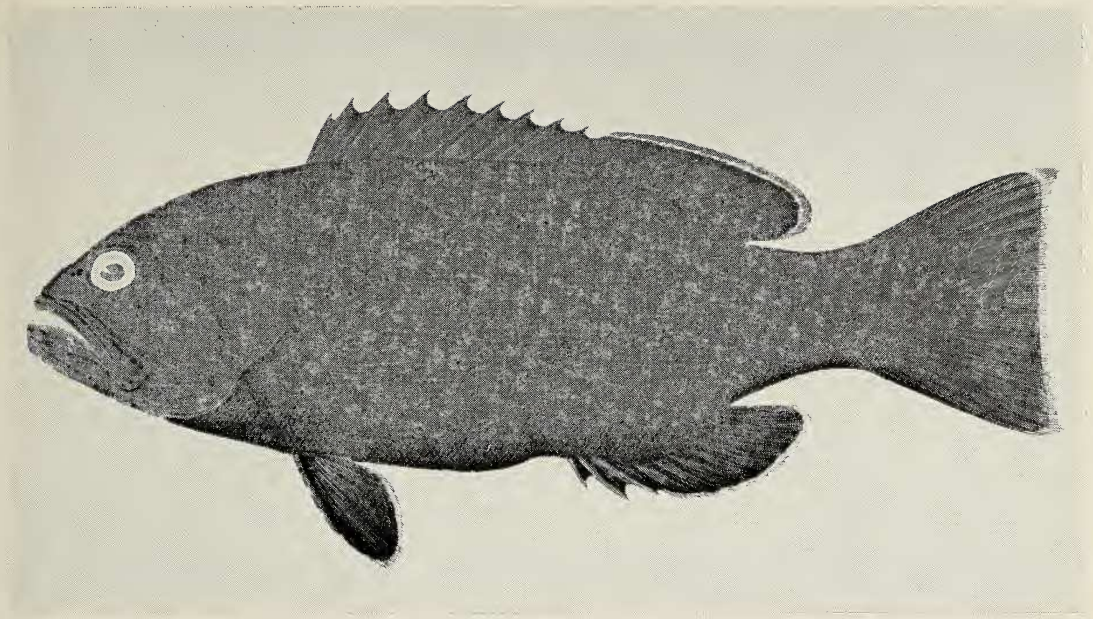

FIG. 1. *Gracila albomarginata* (Fowler and Bean). Photograph by Charles E. Cutress of a color painting from the "Albatross" Philippine Expedition, through the courtesy of Leonard P. Schultz of the U.S. National Museum.

deep blue lines (dark brown in preservative) on head as in Figure 1 of an Indo-Malayan specimen, except three upper lines not continuous (uppermost line broken into two long sections and a spot; second line, from beneath eye, into a long section and two spots; and the third from maxillary groove into three spots). In preservative the edges of the fins were noted to have become white. They may have been reddish in life, as was described from African specimens by Smith (1954).

The single specimen was collected with a spear at a depth of 60 ft on the seaward side of the atoll of Tetiaroa. When seen underwater, *G. albomarginata* has two large white saddle-like areas on the back which are its most striking color markings. Before the speared specimen was brought to the surface, however, the white areas had disappeared and did not reappear.

The species was observed but not collected at the atolls of Takaroa, Takapoto, and Tikahau in the Tuamotu Archipelago. It was seen outside reefs and in passes, usually at depths of about 40 to at least 120 ft, but was never sighted in lagoons. Only once was it observed in water less than 30 ft deep, and when this individual was pursued it retreated into deeper water.

The largest specimen examined is the holotype (USNM 89985), 295 mm in standard length.

TAHITI RECORD OF *Epinephelus truncatus*

Two groupers bearing some resemblance to *Epinephelus fasciatus* were purchased in the market in Papeete, Tahiti, in 1957. They differ from *fasciatus* notably in having a shorter maxillary (maxillary of *fasciatus* extends to beneath posterior edge of eye), broader lips, and an opercular flap with an angularly rounded upper margin (nearly straight on *fasciatus*). The two fish were caught by Tahitian fishermen with hook and line at an unknown depth, but probably in excess of 100 ft, judging from the degree of distension of the stomach into the mouth from an expanded air bladder. The specimens were believed to represent an undescribed species. In the same year that they were collected a paper by Katayama appeared that described the species from islands near Japan as *Epinephelus truncatus.*

Epinephelus truncatus
Fig. 3

Epinephelus truncatus Katayama, 1957. Jap.

Jour. Ichth., vol. 6, p. 158, fig. 4 (type locality: Izu Islands and Bonin Islands).

Epinephelus truncatus Katayama, 1960. Fauna Japonica Serranidae (Pisces), pp. 66, 77, pl. 47.

Two specimens: 222 and 238 mm standard length, Papeete market, Tahiti, May 28, 1957, J. E. Randall. USNM 75400.

Dorsal rays IX, 16 (injury to rear base of fin of one fish); anal rays III, 8; pectoral rays 19; pored scales in lateral line 68 (70); vertical scale rows from upper end of gill opening to base of caudal fin 123 (125); scale rows above lateral line 14 or 15; scales below lateral line to origin of anal fin 28 or 29; gill rakers 7 + 1 + 15 (8 + 1 + 15).

Caudal fin truncate; greatest depth of body at origin of dorsal fin, the depth contained 3 times in standard length; maxillary reaches slightly posterior to a vertical at center of eye; middle opercular spine much larger than other two, posterior in position, and slightly closer to the lower than the upper spine; opercular membrane moderately pointed, reaching posterior to a vertical at origin of pelvic fins; preopercular margin rounded, with a slight indentation above angle; 42 (48) serrations on vertical margin of preopercle, the last four enlarged; dermal flap on maxillary (continuous with upper lip) nearly reaching upper edge of maxillary; base of dorsal and anal fins moderately fleshy; origin of dorsal fin slightly posterior to a vertical at upper base of pectoral fin; anus about one-third distance from pelvic tips (when fins applied to abdomen) to origin of anal fin; first dorsal spine nearly one-third length of second, and second about three-fourths of third; third, fourth, and fifth spines the longest and nearly equal in length; remaining spines progressively shorter, the last only slightly longer than second; front of upper jaw with two large adjacent canines on each side, each of these pairs separated by a gap about equal to half eye diameter; a single row of 15 small canine teeth along side of upper jaw posterior to larger canines; lower jaw with one or a pair of large fixed canines on each side at front separated by a gap about equal to one-third eye diameter; large canines followed by a series of about 40 smaller ones extending the length of the jaw; bands of slender depressible canines medial to fixed canine teeth in both upper and lower jaws; teeth on vomer and palatines; tongue smooth.

Color when fresh dull orange, the centers of scales light greenish gray (centers now darker than edges in preservative); five faint, broad vertical bars on body which faded shortly after preservation; head mottled with light red and orange-brown; edge of orbit, except anteroventrally, bright red (now pale in alcohol); a pale blue line adjacent to red rim of orbit and surrounding entire eye (blue line now dark in alcohol); caudal fin orange-red except olive green on upper fifth; dorsal fin olive green, the outer third of spinous portion light red basally and dark red distally (now pale with a blackish

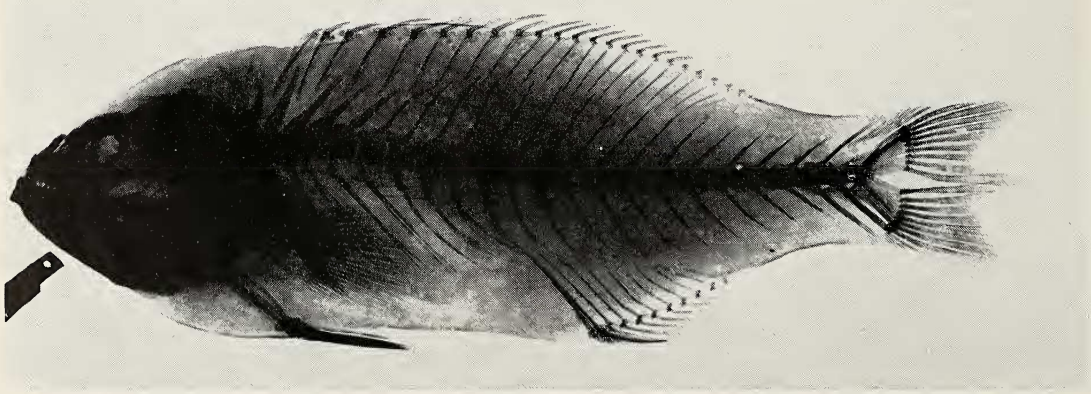

FIG. 2. Holotype of *Gracila albomarginata,* 295 mm standard length, Borneo (USNM 89985). X ray by Victor G. Springer of the U.S. National Museum.

diagonal streak); a few diagonal orange lines in olive green in basal part of fin; rays orange in soft portion of dorsal; extreme base of fin with a red band; remaining fins light orange-red.

Katayama described the color of his specimens as dark red, each scale with a basal spot of greenish brown; membranes between dorsal spines tipped with black; other parts of dorsal olive; upper several rays of caudal olive, the rest of the fin red, with a dark submarginal area and a white edge; other fins red.

Because some differences seemed to exist between the Tahiti specimens and the original description given for *truncatus,* a request was made of Katayama for comparative material. He sent the holotype, a well-preserved specimen 319 mm in standard length. There is now little doubt that his specimen and the two from Tahiti are conspecific. Meristic data are essentially the same. The only morphological differences noted are the slightly more convex interorbital space and more rounded pectoral fins of the specimens from Tahiti. The black areas in the pale distal part of the membranes of the spinous portion of the dorsal fin of the holotype are much better developed (there are only traces of pigment distally on the spinous dorsal of the Tahitian specimens). There is no white caudal margin and dark submarginal band on the specimens from Tahiti (possibly overlooked when specimens were fresh). The border caudal markings are now very faint on the holotype. The pale edge and narrow dark submarginal line around the eye are identical on all three fish. The slight differences in morphology and color are probably due to the disparity in size of the specimens under comparison or are within the range of variability of the species. Some differences might be expected of fish collected at such distant localities as Japan and Tahiti.

ON THE VALIDITY OF *Cephalopholis obtusaurus*

The same fishermen who caught the two specimens of *Epinephelus truncatus* from relatively deep water off Tahiti brought another

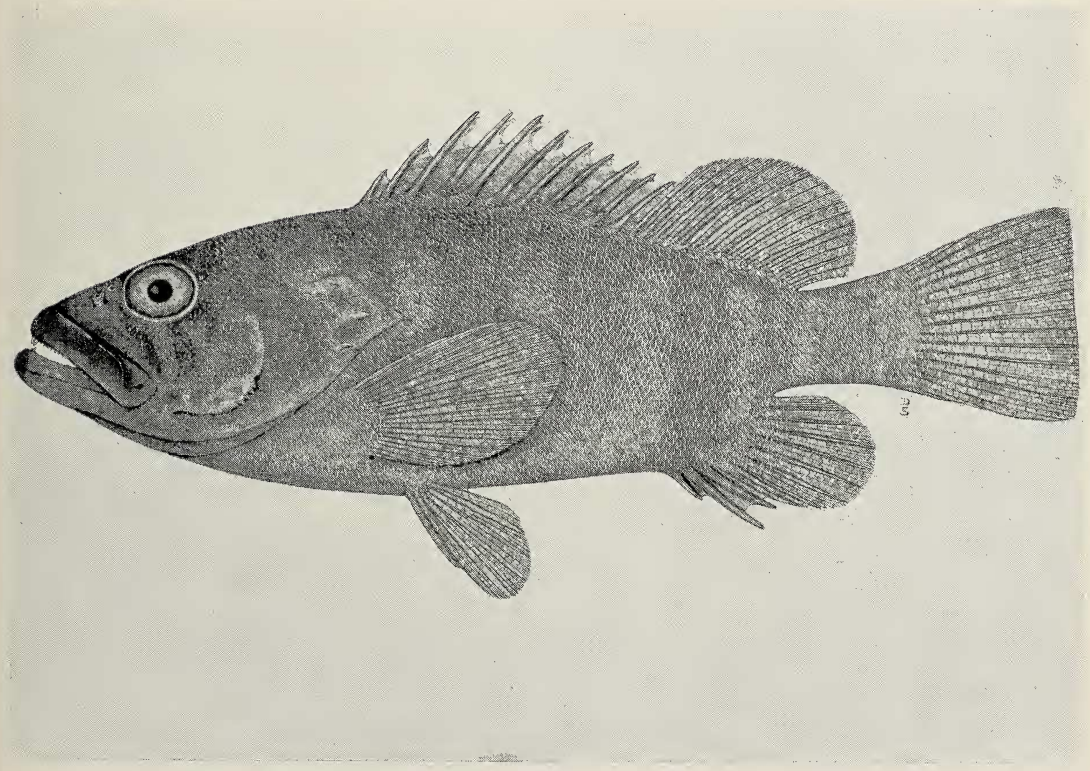

FIG. 3. *Epinephelus truncatus* Katayama, 238 mm standard length, Tahiti (USNM 75400). Drawing by Dorothea B. Schultz.

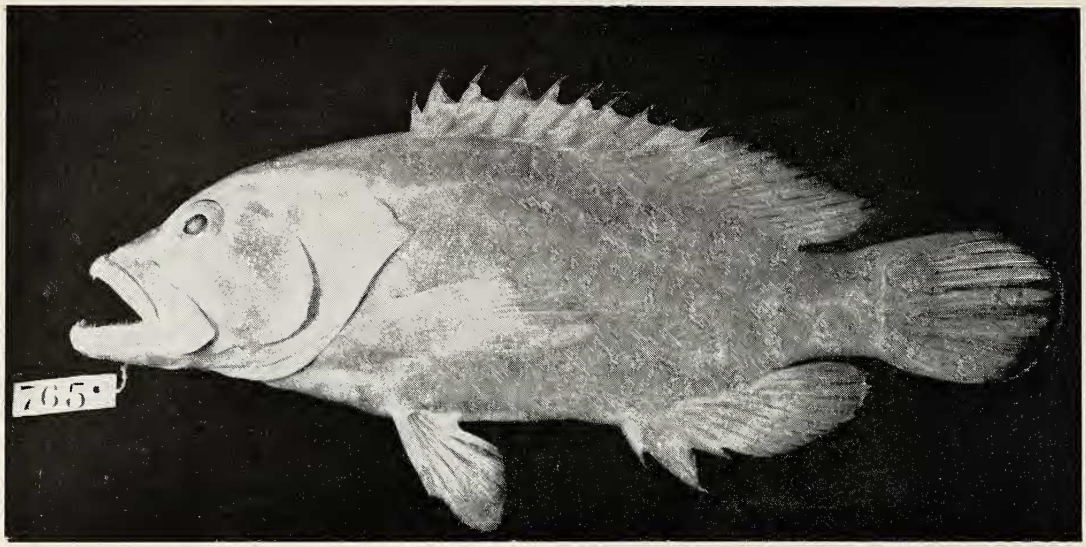

FIG. 4. Holotype of *Cephalopholis aurantius* (Cuvier and Valenciennes), 165 mm standard length, Seychelles (MNHN 765).

small grouper to market which proved difficult to identify. At first it was believed to be *Cephalopholis aurantius* (Cuvier and Valenciennes) (1828). Although this species had not been recorded previously from the Society Islands, another, *Serranus roseus* Cuvier and Valenciennes with a type locality of Tahiti, has been placed in the synonymy of *aurantius* by authors such as Boulenger (1895). Cuvier and Valenciennes described *roseus* from a painting by Parkinson in the library of Banks. A. C. Wheeler of the British Museum (Natural History) kindly sent a photograph of Parkinson's painting. The fish is obviously *Variola louti* (Forskål); thus it has been improperly placed in the synonymy of *aurantius.*

M. L. Bauchot of the Muséum National d'Histoire Naturelle in Paris sent the holotype of *Serranus aurantius* (Fig. 4) so that it might be compared with the specimen from Tahiti. It was soon evident that the two are not the same species.

The following observations were made of the holotype of *aurantius,* which is 165 mm in standard length and 201 mm in total length: dorsal rays IX, 15 (last ray composite, first unbranched); anal rays III, 9 (last ray composite); pectoral rays 18 (all branched except uppermost; 15 branched caudal rays; pored lateral-line scales 53 (includes 3 beyond hypural); vertical scale rows from upper end of gill opening to end of hypural about 113; gill rakers 9 + 1 + 15; depth of body 2.83 in standard length; head length 2.5 in standard length; width of body 2.3 in head length; greatest diameter of eye 6 in head length; interorbital space moderately convex, the fleshy width equal to vertical diameter of eye; maxillary reaches slightly posterior to eye; middle opercular spine slightly nearer lower than upper spine; opercular flap pointed; preopercular margin broadly rounded with a slight indentation at angle; upper limb and indentation of preopercular margin finely denticulate; small scales on head, including maxillary and mandible; scales on head and anteriorly on body cycloid; a pair of adjacent canine teeth in upper jaw (one missing on one side) separated by a space equal to .8 eye diameter; comparable canines in lower jaw separated by about .3 eye diameter; bands of villiform teeth in jaws broad anteriorly; narrow V-shaped band of villiform teeth on vomer, and narrow band on palatine in length equal to .5 eye diameter; longest gill raker at angle, about 1.5 times longer than gill filaments; pectoral fins reach a vertical at origin of anal fin; tips of pelvic fins reach slightly beyond anus; color in alcohol uniform pale yellowish; a black submarginal band at posterior

border of caudal fin, its width about one-third diameter of pupil; narrow blackish margin on rear half of soft portion of dorsal and all of soft portion of anal fins; a trace of dark pigment marginally on tips of pelvic fins.

Cuvier and Valenciennes described the color of the body and fins of *aurantius* as orange-red, without spots or bands. Bleeker (1873–1876:37, pl. 248, fig. 3) portrayed the species in color. It is rose-orange with small round blue spots on the head and the back beneath the spinous portion of dorsal fin; there is a broad yellow posterior border on the medial fins; the caudal fin has a black line within this yellow border.

The Tahiti specimen was finally identified as *Cephalopholis obtusaurus* Evermann and Seale (1907), after examination of the holotype in the U.S. National Museum. This species has not been recognized by authors after Evermann and Seale. Fowler and Bean (1930), Herre (1953), and Katayama (1960) have all placed it in the synonymy of *aurantius;* however, *obtusaurus* appears to be valid.

Cephalopholis obtusaurus
Figs. 5, 6.

Cephalopholis obtusaurus Evermann and Seale, 1907. Bull. Bur. Fisheries, vol. 26, p. 77, fig. 12 (type locality: Bacon, Sorsogon, Luzon, Philippine Islands).

One specimen: 185.5 mm standard length, 228 mm total length, Papeete market, Tahiti, May 28, 1957, J. E. Randall. USNM 175409.

Dorsal rays IX, 15; anal rays III, 9; pectoral rays 17; pored lateral-line scales 52 (includes 3 beyond hypural); vertical scale rows from upper end of gill opening to end of hypural 103; gill rakers 7 + 1 + 13.

Depth of body 2.77 in standard length; head length 2.50 in standard length; width of body 2.3 in head length; eye 5.1 in head length; bony interorbital nearly flat, the bony width 7.8 in head length; least depth of caudal peduncle 2.74 in head length; pectoral fins 3.83 in standard length; pelvic fins 4.52 in standard length, the tips reaching anus; third dorsal spine the longest; its length 3.36 in head length; first dorsal spine half as long as third; tenth dorsal soft ray the longest, its length 2.24 in head length; second anal spine the longest, its length 3.04 in head length; fifth anal soft ray the long-

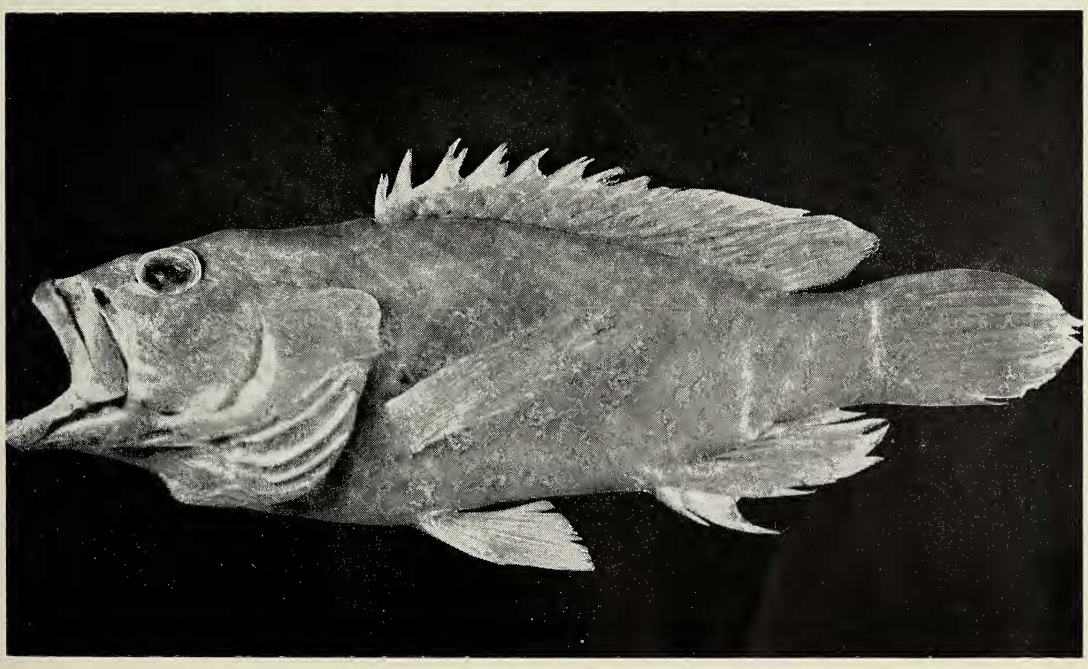

FIG. 5. Holotype of *Cephalopholis obtusaurus* Evermann and Seale, 191 mm standard length, Philippine Islands (USNM 55910).

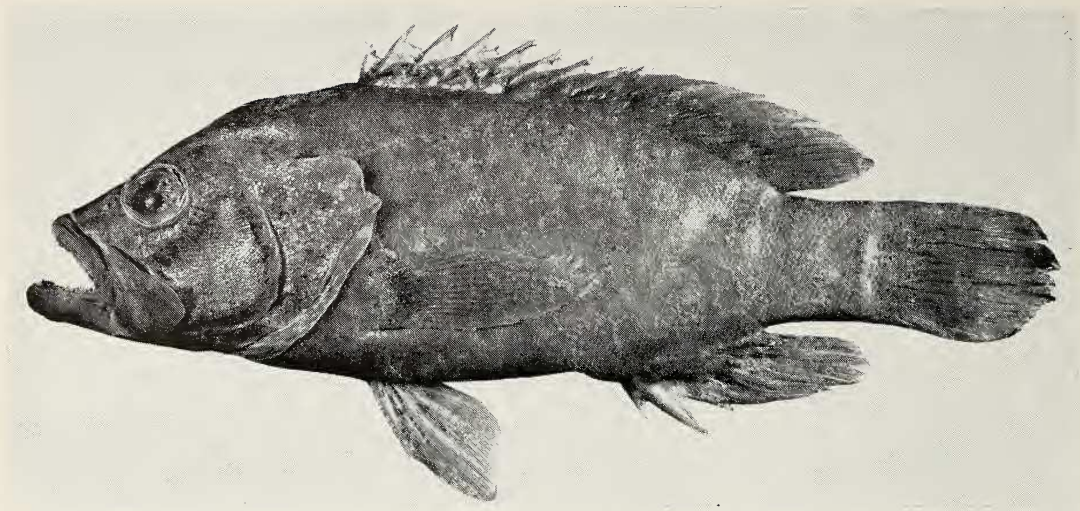

FIG. 6. *Cephalopholis obtusaurus* Evermann and Seale, 185.5 mm standard length, Tahiti (USNM 175409).

est, its length 1.95 in head length; dorsal fin very fleshy at base; maxillary reaches posterior edge of eye; maxillary scaled, but scales mostly imbedded; opercular spines flattened, not sharp, the middle one closer to lower spine (which is somewhat anterior) than to upper; hind part of opercular membrane truncate with rounded corners; preopercular margin very finely serrate.

Color when fresh: body and fins bright orange-red, the edges of scales faintly brownish, with widely scattered small pale blue blotches; head, nape, and fins with numerous small red spots, these more evident in faint blue areas on head and caudal fin. In alcohol the specimen is pale yellowish brown with no trace of spots. Evermann and Seale described the color of the holotype as uniform yellowish, with a slight wash of dull brown, and stated that the fish was evidently uniform red in life. However, the preserved specimen shows faint, close-set pale spots (about 2 mm in diameter) on the nape.

Some differences were noted between the specimen from Tahiti and the holotype (which is nearly the same size; it measures 191 mm in standard length and approximately 238 mm in total length; the latter measurement difficult to obtain because the mouth is fully open). The holotype has a slightly smaller eye (5.64 in head length), slightly deeper caudal peduncle (3.03 in head length), maxillary not as broad (greatest width 5.5 in head length of Tahitian specimen and 6.3 in head length of holotype), longer pectoral fins, slightly longer pelvic fins (the tips reach slightly beyond anus in holotype), and longer gill rakers. In view of the many similarities, however, such as the meristic data (all counts the same except for fewer scale rows from gill opening to end of hypural—about 95 in holotype), obtuse opercular flap, position of opercular spines, fleshy dorsal fin, and color, the two specimens are regarded as belonging to the same species.

The stomach of the holotype of *obtusaurus* is protruding into the mouth cavity, thus suggesting that the specimen was taken from moderately deep water.

Cephalopholis obtusaurus and *C. aurantius* are evidently closely related species. They may be distinguished principally by the more pointed opercular flap, more convex interorbital, smaller eye, larger mouth, and higher gill raker counts of *aurantius*. Also, *aurantius* has the characteristic black submarginal line at the posterior edge of the caudal fin, which is lacking in *obtusaurus*.

Although other specimens of *obtusaurus* may be present in museums, possibly labelled as *aurantius*, the author knows of only the holotype from the Philippines and the one specimen from Tahiti.

ADDITIONAL SPECIMEN OF *Epinephelus socialis* FROM TAHITI

Epinephelus socialis
Fig. 7

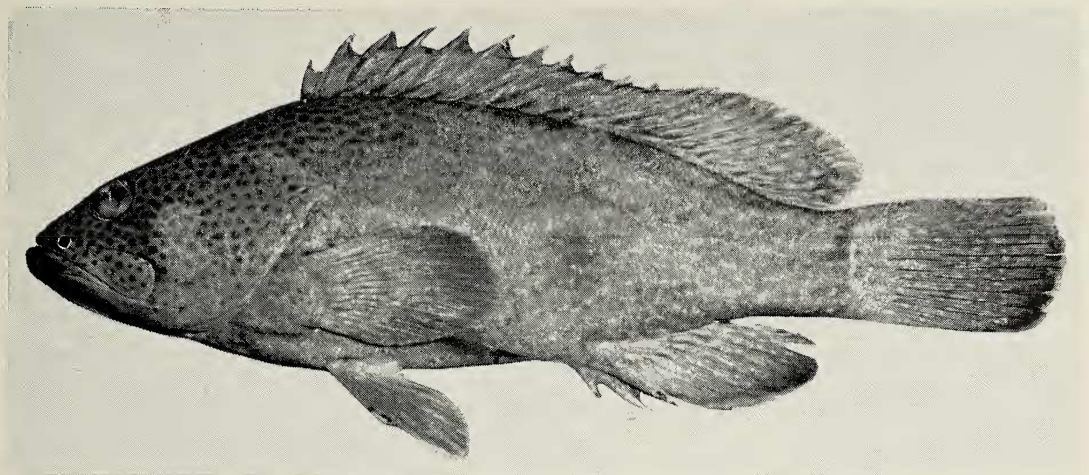

FIG. 7. Lectotype of *Epinephelus socialis* (Günther), 190 mm standard length, Tahiti (BM 1873.4.3.1).

Serranus socialis Günther, 1873. Fische der Südsee (J. Mus. Godeffroy); vol. 1, pt. 1, p. 7, pl. 8, fig. B (type locality: Tahiti, as restricted by lectotype designation below).

One specimen: 276 mm standard length, Papeete market, Tahiti, May 25, 1957, J. E. Randall. USNM 175407.

Color when fresh: head and body with numerous small dark brown spots, these becoming confluent on posterior part of body to form irregular horizontal lines; caudal and soft portions of dorsal and anal fins dark brown with white spots, the anal and posterior part of caudal with a white border; spinous portion of dorsal fin light brown with irregular dark brown spots; pectorals light brown with brown spots basally, dark brown distally with a few pale spots in middle of fin; pelvic fins dark brown, the rays spotted basally, the lateral edge of the fin white near tip.

Three syntypes of *Epinephelus socialis* were examined in the British Museum in London. The largest of the three specimens (190 mm standard length, 236 mm total length) (BM 1873.4.3.1) from Tahiti is here designated as lectotype. Meristic data from this specimen are as follows: dorsal rays XI, 15; anal rays III, 8; pectoral rays 19; vertical scale rows from upper end of gill opening to end of hypural 103; gill rakers 9 + 1 + 16.

A year and a half of collecting fishes in Tahiti resulted in the taking of only the single specimen of this grouper. A second specimen was speared by the author in the lagoon of Takaroa in the northern Tuamotu Archipelago, at a depth of 15 ft. This was deposited in the collection of the George Vanderbilt Foundation, Stanford University.

E. socialis has been recorded from Mangareva in the southern Tuamotus (Kendall and Radcliffe, 1912). Recently it has been listed among the fishes of the Marshall Islands (Schultz et al., 1953). Poll (1942:6, fig. 1) recorded two juveniles from the lagoon of Punaauia, Tahiti.

THE IDENTITY OF *Epinephelus fuscoguttatus* (FORSKÅL)

Forskål (1775:42) described *fuscoguttatus* from the Red Sea as a variety of *Perca summana.* The latter is a white-spotted grouper now classified in the genus *Epinephelus.* The description of *fuscoguttatus* is brief, but the name has long been recognized as a species of *Epinephelus* distinct from *summana.* The most important characteristics given by Forskål are a black spot on the dorsal part of the caudal peduncle, circular reddish-brown spots, and 18 pectoral rays.

Morgans (1958) utilized the name *fuscoguttatus* for a species which Randall (1955) identified as *Epinephelus horridus* (Cuvier and Valenciennes). He applied the name *Epinephelus dispar* (Playfair) (in Playfair and Günther, 1866) to the grouper identified as *fuscoguttatus* by Schultz

(1953) and Randall (1955). The confusion in deciding to which species the name *fuscoguttatus* should be applied is by no means confined to the authors just mentioned.

Information was requested of Jørgen Nielsen of the Universitetets Zoologiske Museum in Copenhagen on the type of *fuscoguttatus*. He replied that the type of *summana*, a dried skin about 160 mm in standard length and still showing the characteristic white spots of the species, is extant, but no type material of variety *fuscoguttatus* is available.

The two species so long confused under the one name *fuscoguttatus* have numerous small reddish-brown spots and a prominent black saddle-like marking on the caudal peduncle. The one character given by Forskål which suggests one of the two species and not the other is 18 pectoral rays. The name *fuscoguttatus* is therefore restricted to the species with 18 or 19 pectoral rays, which is in agreement with the use of the names by Morgans, the most recent revisor (he did not, however, record pectoral ray counts).

The oldest available name for the other species appears to be *Serranus microdon* Bleeker (1856) (type locality, Java); thus *Epinephelus microdon* replaces the name *Epinephelus dispar* (Playfair) used by Morgans.

Data on the holotype of *microdon* were obtained from M. Boeseman of the Rijksmuseum van Natuurlijke Historie in Leiden, and later the specimen was examined by the author. This grouper (RMNH 5510) is now 400 mm in standard length and 490 mm in total length. Although in good condition, it was preserved with the body curved; therefore, according to Boeseman, the original length was probably a few centimeters longer. The specimen was purchased at auction in 1879, and since Bleeker (1873–1876) indicated that he had only a single 510 mm example of the species, there is little doubt that the Leiden specimen is the true holotype. Because of the curvature of the body, the photograph supplied by Boeseman (Fig. 8) shows the head foreshortened. The two broad dark bars on the body are not pigmented regions but shadows from large wrinkles resulting from an attempt to straighten the body before the photograph was taken. A second illustration of *microdon* (Fig. 9) is provided from a photograph of a smaller specimen from the Phoenix Islands.

E. fuscoguttatus and *E. microdon* may be distinguished as follows: *fuscoguttatus*, pectoral rays 18 or 19; gill rakers on lower limb of first arch 17–20 (including rudiments but not raker at angle); dorsal profile of head with an inden-

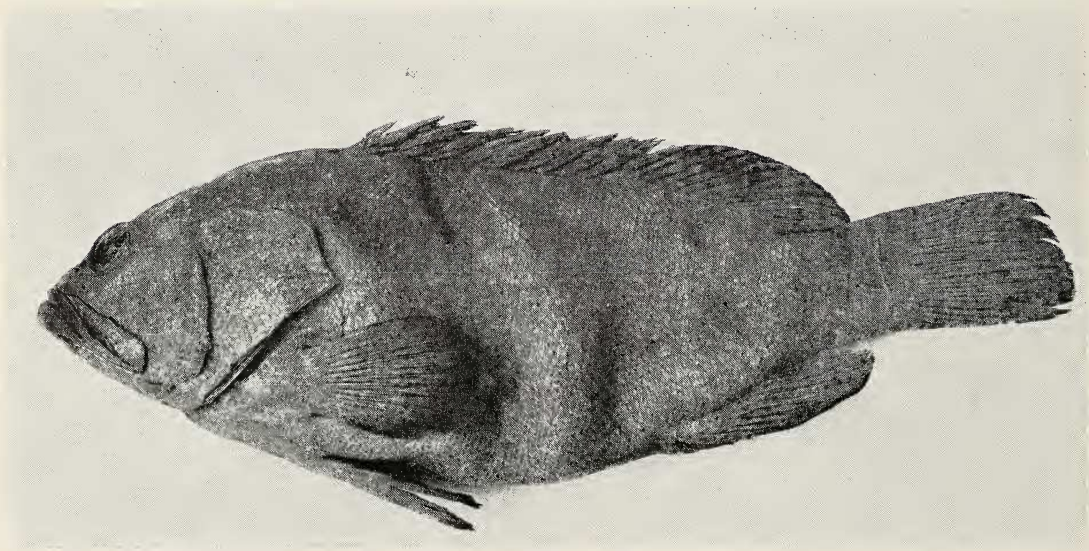

FIG. 8. Holotype of *Epinephelus microdon* (Bleeker), 400 mm in standard length, Java (RMNH 5510). Photo supplied by M. Boeseman of the Rijksmuseum van Natuurlijke Historie at Leiden.

tation above hind edge of eye; maxillary extends from ¾ to 1 eye diameter posterior to eye (seven specimens: 120–334 mm standard length, Red Sea, Zanzibar, and Gilbert Islands); *microdon,* pectoral rays 16 or 17 (usually 17); gill rakers on lower limb of first arch 15 or 16; dorsal profile of head smoothly convex; maxillary ends beneath hind edge of eye or extends up to half an eye diameter posterior to eye (nine specimens: 153–350 mm standard length; from Red Sea, Zanzibar, Gilbert Islands, Marshall Islands, and Phoenix Islands).

There is a slight difference in the depth of the body, *microdon* being the more slender form on the average (depth 2.7–3 in standard length; that of *fuscoguttatus* is 2.6–2.9). The dorsal soft rays of *fuscoguttatus* are 14 (rarely 15) and those of *microdon* 14 or 15 (usually 15).

Morgans (1958:656) has separated the species in a key on color. He noted that the spots of *microdon* (at least of adults) are more regular in outline than those of *fuscoguttatus.* An additional color difference is the nature of the spot beneath the spinous portion of the dorsal fin. Adults of *E. microdon* have a single roundish dark blotch centered at the base of the fifth dorsal spine; *fuscoguttatus* has two close-set blotches or a single bilobed one.

Morgans described *tukula,* a third species of *Epinephelus* from the western Indian Ocean which can be confused with *fuscoguttatus* and *microdon.* It is distinguished by the lack of small spots on the body, many rows of teeth at the front of both jaws, subequal nostrils, convex interorbital, and large size (it is believed to attain a weight of at least 240 lb). In the author's opinion *tukula* is the same as Playfair's *Serranus dispar* variety a. Since Morgans restricted *dispar* to variety b, his new species *tukula* is valid whether variety a is the same or not (unless an earlier name is found).

In view of the absence of a holotype and the instability of the classification of this complex of serranid fishes, a neotype is herein described of *fuscoguttatus,* based on a specimen from the Red Sea, the type locality.

NEOTYPE OF *Epinephelus fuscoguttatus* (FORSKÅL): USNM 147594, 216 mm in standard length and 267 mm in total length, collected by Donald S. Erdman at the S.A.M. pier at Jidda, Red Sea, on July 2, 1948 (Fig. 10).

Dorsal rays XI, 14; anal rays III, 8; pectoral rays 19; gill rakers 12 + 1 + 18 (two additional small rakers between larger rakers of upper limb not counted); vertical scale rows from upper end of gill opening to end of hypural plate about 127; 25 scales in diagonal row above lateral line to origin of dorsal fin.

The following measurements are expressed as

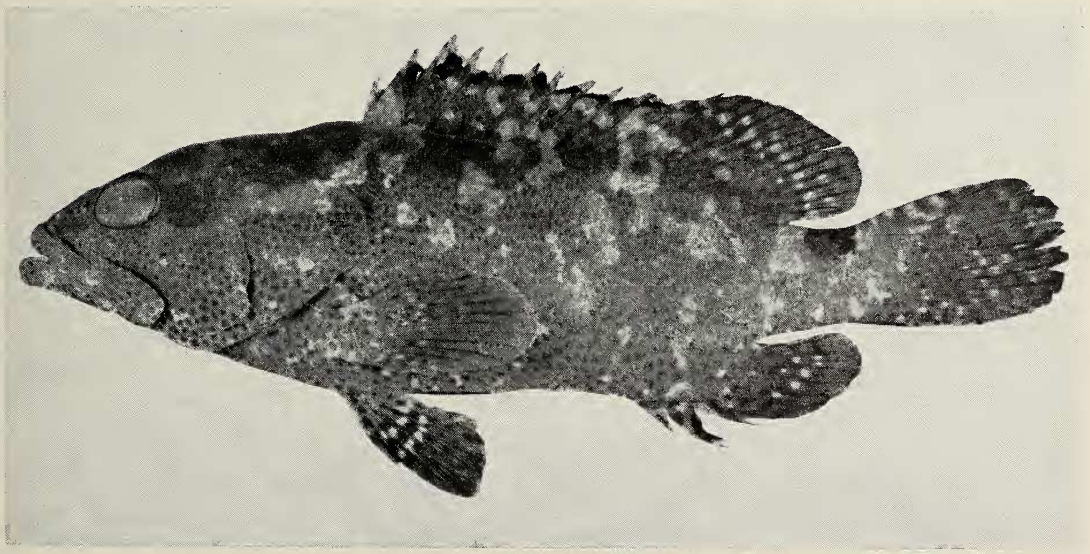

FIG. 9. *Epinephelus microdon* (Bleeker), 153 mm standard length, Canton, Phoenix Islands (USNM 115367).

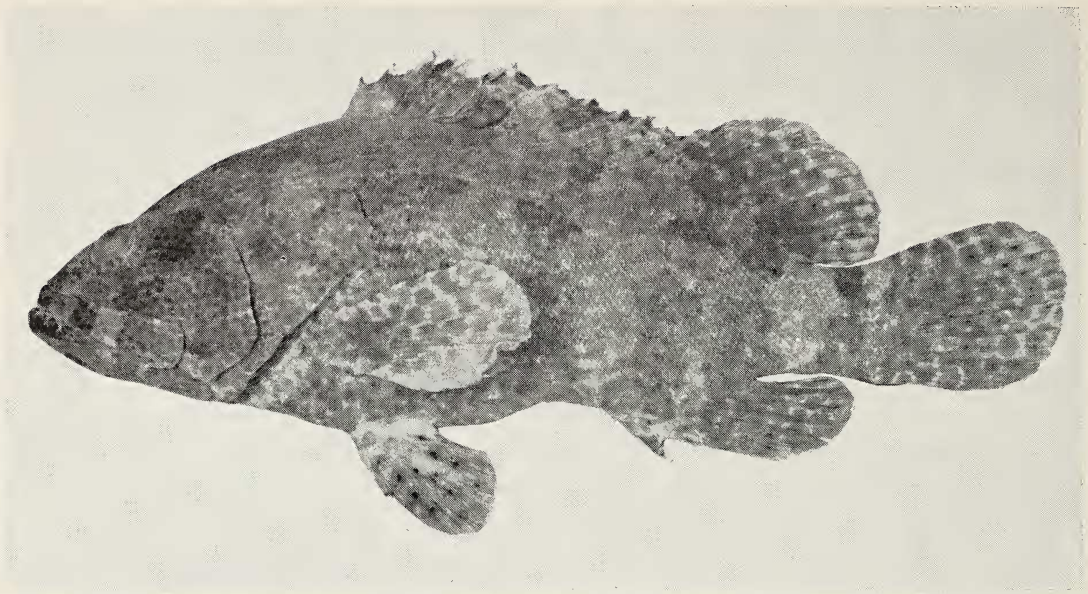

FIG. 10. Neotype of *Epinephelus fuscoguttatus* (Forskål), 216 mm standard length, Jidda, Red Sea (USNM 147594).

a percentage of the standard length: greatest depth of body 38.2; width of body just behind gill opening 18.5; head length 41.4; snout length 6.1; eye diameter 6.8; postorbital length of head 27.8; horizontal distance of maxillary posterior to eye 5.4; bony interorbital space 4.9; least depth of caudal peduncle 13.0; length of caudal peduncle (to rear base of dorsal fin) 9.0; snout to origin of dorsal fin 42.4; snout to origin of anal fin 71.1; snout to origin of pelvic fin 39.8; length of dorsal fin base 57.2; length of anal fin base 17.3; length of pectoral fin 22.1; length of pelvic spine 11.1; length of pelvic fin 20.3; length of first dorsal spine 5.7; length of second dorsal spine 8.6; length of third dorsal spine 11.3; length of fourth (longest) dorsal spine 12.2; length of eleventh dorsal spine 11.4; length of first dorsal soft ray 15.0; length of longest dorsal soft ray 18.0; length of last dorsal soft ray 10.2; length of first anal spine 4.3; length of second anal spine 9.6; length of third anal spine 9.3; length of first anal soft ray 14.7; length of longest anal soft ray 18.5; length of last anal soft ray 12.2; length of caudal fin 23.6.

Profile of head consisting of two convexities which meet above center of eye; interorbital flat over most of its width (in center), rising slightly at orbits; lower jaw projecting 2.5 mm anterior to upper; middle opercular spine nearer lower than upper spine (7 mm separate tips of lower and middle spines and 12.2 mm separate tips of upper and middle spines); upper margin of opercular membrane nearly horizontal anteriorly, becoming rounded as it meets vertical hind margin (which has a protrusion slightly below level of middle opercular spine); preopercular margin very finely serrate, with no marked indentation; scales cycloid, those on head very small; maxillary finely scaled; posterior nostril subtriangular in shape, 3.8 mm in greatest measurement (height), with no rim; anterior nostril less than 1 mm in diameter, with a membranous rim which is higher posteriorly; teeth typical of genus, those on vomer small; teeth on palatine about twice as large as vomerine teeth but still not large; enlarged canines of upper jaw (a close-set pair on one side, a single tooth on the other) separated by a gap of 10 mm; single row of small, evenly spaced, fixed canine teeth along side of upper jaw; smaller depressible teeth in upper jaw in a broad patch anteriorly on each side (up to a maximum of about six irregular rows); depressible teeth of lower jaw in a band of more uniform width

(about three or four irregular rows); hind borders of all fins well-rounded; tips of pelvic fins reach within 8 mm of anus.

Color in alcohol brown with irregular dark brown blotches (those on upper third of body nearly black) and numerous small dark spots which are more evident on head and anteriorly on body. The irregular dark blotches are located as follows: an elongate one begins from lower half of hind edge of eye and angles upward to nape, meeting its fellow anterior to origin of dorsal fin; five other blotches or pairs of blotches may be seen middorsally on head anterior to one just mentioned; three irregular dark bands cross maxillary, lower jaw, and chin; all dark blotches and bands on head superimposed with the small round darker brown spots; a bilobed dark brown spot on back centered at base of fifth dorsal spine; a small dark brown spot at base of ninth and tenth dorsal spines; two irregular dark brown spots at base of soft portion of dorsal fin and a black saddle dorsally on caudal peduncle; an elongate irregular dark brown blotch below and slightly anterior to bilobed spot at base of fifth dorsal spine (lateral line runs through upper part of this blotch); a dark brown blotch in line with but posterior to the one just mentioned, also touching lateral line; five irregular brown bars on lower half of body in line with the more dorsal darker markings; dark spots along base of dorsal fin extend irregularly into fin, more obviously into spinous portion; soft portion of dorsal and other fins with interconnected round brown spots with small black centers (dark centers not very evident on pectorals); a dark brown marginal spot on each interspinous membrane of dorsal fin (except cirrus of each which is pale); other fins with very narrow pale margins.

Two syntypes of *Serranus horridus* Cuvier and Valenciennes from Java are also located at Leiden (RMNH 19 and 2160). Both are stuffed specimens, one 188 mm in standard length and the other 600 mm. The larger is in better condition and is here designated as the lectotype. These fish have 18 or 19 pectoral rays, a dark saddle on the caudal peduncle (not mentioned by Valenciennes in the original description), and 14 dorsal soft rays. There are two dark saddles on the back between the bases of the fourth and sixth dorsal spines, another at the end of the spinous portion of the dorsal fin, and one or two below the soft portion of the fin. *S. horridus* therefore seems to be a synonym of *Epinephelus fuscoguttatus.*

Another fish which seems to belong in the synonymy of *fuscoguttatus* is *Serranus lutra* Cuvier and Valenciennes from Mauritius. The holotype (MNHN 7278), 315 mm in standard length and 382 mm in total length, was examined by M. Blanc and R. Roux at the Muséum National d'Histoire Naturelle in Paris. They

FIG. 11. Holotype of *Serranus lutra* Cuvier and Valenciennes (= *fuscoguttatus*), 315 mm standard length, Mauritius (MNHN 7278). Photo by J. Abel, through the courtesy of M. Blanc of the Muséum National d'Histoire Naturelle in Paris.

report that it has 19 pectoral rays and 14 dorsal soft rays. A photograph was kindly supplied by Blanc, herein reproduced as Figure 11.

Blanc and Roux also examined the type of *Serranus taeniochirus* Cuvier and Valenciennes, a species which has been placed by some authors in the synonymy of *fuscoguttatus;* however this does not seem to be correct. *S. taeniochirus* has 16 dorsal soft rays and lacks a dark spot dorsally on the caudal peduncle; therefore it is probably neither *fuscoguttatus* nor *microdon.*

At the request of the author, Eugenie Clark procured a specimen of *fuscoguttatus* from the Red Sea. The specimen (USNM 197323) measures 574 mm in standard length, 700 mm in total length, and weighs (in preservative) 9½ pounds. It was caught by trolling in 12 ft of water off Entedebin, Dahlak Archipelago, on April 5, 1962. The spots on the body were orange-brown in life, more orange ventrally, and there is a prominent black saddle on the caudal peduncle. There are 19 pectoral rays, 15 dorsal soft rays (the last two closely spaced), and 9 + 1 + 17 gill rakers. The rakers on the upper limb are sessile and difficult to count. Previous counts of the rakers on the upper limb of smaller specimens of *fuscoguttatus* were all 11–13. Possibly there is a loss of gill rakers in larger fish because of fusion.

This is the largest specimen examined by the author. Morgans (1958) reported *fuscoguttatus* from East Africa to a standard length of 760 mm, a total length of 885 mm, and a weight of 24 lb. Boulenger (1895) reported the largest as 900 mm total length. It seems obvious that it attains a greater size than does *microdon,* the largest of which examined by Morgans is 465 mm in standard length, 565 mm in total length, and 8½ lb in weight.

A 334-mm specimen from Onotoa, Gilbert Islands, collected by the author in 1951, was colored in life as follows: light brownish yellow with numerous small orange-brown spots (more evident on head than on body) and large irregular dark brown blotches (smaller spots superimposed on the large dark blotches); one of the irregular blotches begins behind the eye and extends to the nape; those on the body occur in an irregular series of five bars, the last on the caudal peduncle beginning with the dark dorsal blotch. The large blotches are darker on the upper third of the body than on the lower two-thirds.

No individuals of *fuscoguttatus* were seen or collected in Tahiti or other islands of French Oceania. *E. microdon,* on the other hand, is common in the Tuamotu Archipelago, although rare in the Society Islands.

THE IDENTITY OF *Epinephelus tauvina* (FORSKÅL)

Figure 12 represents a photograph of the holotype of *Perca tauvina* Forskål, a dried skin, from the Red Sea. It was provided by Jørgen Nielsen of the Universitetets Zoologiske Museum in Copenhagen. He also supplied the following fin-ray counts for the specimen: dorsal rays XI, 15 or 16; anal rays III, 8; pectoral rays 18.

Epinephelus elongatus Schultz was described from specimens collected in the Marshall Islands, Mariana Islands, Samoa Islands, and Phoenix Islands. Two specimens in the National Museum, 110 and 218 mm in standard length, (USNM 166985–6) collected at Ghardaqa, Red Sea, by Eugenie Clark, were compared to the Pacific material of *elongatus* and proved to be the same. Specimens of *elongatus* of the same size as the holotype of *tauvina* (larger specimens have more spots than smaller ones) were compared with the photograph of the holotype, and they appear identical; thus the decision by Katayama (1960) to refer *elongatus* to the synonymy of *tauvina* seems correct.

Epinephelus tauvina is not common in the Society Islands. The largest of 12 specimens that were collected is 498 mm in standard length. In the smaller sizes it can be confused with two small dark-spotted groupers, *Epinephelus merra* and *E. hexagonatus.* It may be differentiated from these in having 15 instead of 16 dorsal soft rays, 27–30 gill rakers (total count) on the first arch (gill rakers of *merra* range from 20 to 23 and those of *hexagonatus* from 23 to 27), and more elongate body (depth 3.3–3.7 in standard length in contrast to 3.2–3.3 for the other two species). *E. tauvina* was observed at depths of 10–150 ft (few observations were made in deeper water) in both lagoon and outer reef environments.

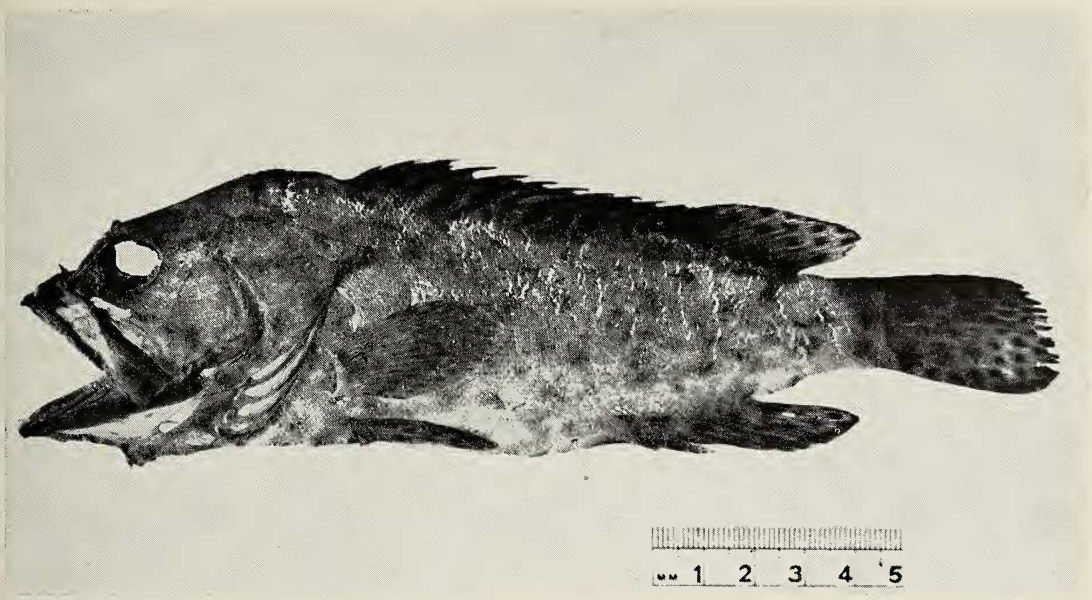

FIG. 12. Holotype of *Epinephelus tauvina* (Forskål), 171 mm standard length, Red Sea (Z. M. Cph. 18). Photo supplied by Jørgen Nielsen of the Universitetets Zoologiske Museum in Copenhagen.

Smith and Smith (1963:15, pl. 141) described *Epinephelus salonotus* from the western Indian Ocean. The type, a 10-inch specimen, was taken at Delgado, East Africa. The illustration depicts a 2-ft specimen from the Seychelles. Although the description is only 2½ lines in length and the figure small, there seems little doubt that the species is *tauvina*.

SUMMARY

1. *Cephalopholis albomarginatus* Fowler and Bean, known previously from the East Indies and Philippines (original description) and the western Indian Ocean, is here reported from Tetiaroa, Society Islands. It is reclassified in the new genus *Gracila,* distinct from *Cephalopholis* principally in having a shorter head length (3.1 in standard length) and an emarginate caudal fin. The related *Aethaloperca* may be separated from *Gracila* by its steeper head profile, deeper body, more than two rows of teeth at the side of the lower jaw, and larger anal spines.

2. The range of *Epinephelus truncatus* Katayama is extended from the Izu and Bonin islands (type locality) to Tahiti.

3. *Serranus roseus* Cuvier and Valenciennes, heretofore regarded as a synonym of *Cephalopholis aurantius* (Cuvier and Valenciennes), is synonymous with *Variola louti* (Forskål) (1775).

4. *Cephalopholis obtusaurus* Evermann and Seale, represented previously only by the type from the Philippines, is resurrected from the synonymy of *C. aurantius* and recorded from Tahiti.

5. A second specimen of the rare grouper *Epinephelus socialis* (Günther) is recorded from Tahiti. The first, the largest of three syntypes in the British Museum, is designated lectotype, thus restricting the type locality to Tahiti.

6. The name *Epinephelus fuscoguttatus* (Forskål) has been applied to either of two common groupers with reddish-brown spots and a black saddle on the caudal peduncle. It is here restricted to the species with 18 or 19 pectoral rays, 17–20 gill rakers on the lower limb of the first arch (including rudiments but not raker at angle), a more marked indentation in the profile of the head, and a larger mouth. The oldest available name for the other species, which has 16 or 17 pectoral rays and 15 or 16 gill rakers on the lower limb, is *Epinephelus microdon* (Bleeker) (1856). A neotype of *fuscoguttatus* is described.

7. *Serranus horridus* Cuvier and Valenciennes and *S. lutra* Cuvier and Valenciennes are synonyms of *fuscoguttatus,* and *S. dispar* Playfair is the same as *microdon. S. taeniochirus* Cuvier and Valenciennes, considered a synonym of *fuscoguttatus* by some authors, is neither *fuscoguttatus* nor *microdon.*

8. *Epinephelus elongatus* Schultz and *Epinephelus salonotus* Smith and Smith appear to be synonyms of *Epinephelus tauvina* Forskål.

REFERENCES

BLEEKER, P. 1856. Verslag omtrent eenige vischsoorten gevangen san de zuidkust van Malang in Oost-Java. Nat. Tijdschr. Neder.-Indië 11:81–89.

——— 1873–1876. Atlas Ichthyologique des Indes Orientales Néêrlandaises . . . Percoïdes I. Vol. 7. De Breuk and Smits, Leiden. 126 pp., 41 pls.

BOULENGER, G. A. 1895. Catalogue of the Fishes of the British Museum. Vol. 1. 2nd ed. London. xix + 394 pp., 15 pls.

CUVIER, G., and A. VALENCIENNES. 1828. Histoire Naturelle des Poissons. Vol. 2. F. G. Levrault, Paris. xxi + 490 pp.

EVERMANN, B. W., and A. SEALE. 1907. Fishes of the Philippine Islands. Bull. Bur. Fisheries 26: 51–110, 22 figs.

FORSKÅL, P. 1775. Descriptiones Animalium Avium, Amphibiorum, Piscium, ... Mölleri, Hauniae. 164 pp., 43 pls.

FOWLER, H. W. 1904. A collection of fishes from Sumatra. J. Acad. Nat. Sci. Phila., ser. 2, 12(4):495–560, 21 pls.

——— and B. A. BEAN. 1930. Contributions to the Biology of the Philippine Archipelago and Adjacent Regions. The Fishes of the Families Amiidae, ... Bull. U.S. Natl. Mus. 100, 10:ix + 334 pp., 27 figs.

HERRE, A. W. 1953. Checklist of Philippine Fishes. U.S. Fish Wildl. Serv. Res. Rep. 20. 977 pp.

KATAYAMA, M. 1957. Four new species of serranid fishes from Japan. Jap. J. Ichth. 6(4–6): 153–159, 4 figs.

——— 1960. Fauna Japonica Serranidae (Pisces). Tokyo News Service, Ltd., Tokyo. viii + 189 pp., 86 pls.

KENDALL, W. C., and L. RADCLIFFE. 1912. Reports on the scientific results of the expedition to the eastern tropical Pacific, . . . "Albatross" . . . XXV. The shore fishes. Mem. Mus. Comp. Zoöl. 35(3):77–171, 8 pls.

MORGANS, J. F. C. 1958. Three confusing species of serranid fish, one described as new, from East Africa. Ann. Mag. Nat. Hist., ser. 13, 1:642–656, 3 pls.

PLAYFAIR, R. L., and A. C. GÜNTHER. 1866. The Fishes of Zanzibar. J. Van Voorst, London. xiv + 153 pp., 21 pls.

POLL, M. 1942. Les poissons de Tahiti recueillis par G. A. de Witte. Bull. Mus. Roy. Hist. Nat. Belgique 18(61):1–20, 4 figs.

RANDALL, J. E. 1955. Fishes of the Gilbert Islands. Atoll Res. Bull. 47:xi + 243 pp., 2 figs.

———and V. E. BROCK. 1960. Observations on the ecology of epinepheline and lutjanid fishes of the Society Islands, with emphasis on food habits. Trans. Amer. Fisheries Soc. 89 (1): 9–16.

SCHULTZ, L. P. et al. 1953. Fishes of the Marshall and Marianas Islands. Bull. U.S. Natl. Mus. 202, 1:xxxii + 685 pp., 74 pls., 90 text figs.

SMITH, J. L. B. 1954. Four rare serraniform fishes from East Africa. Ann. Mag. Nat. Hist., ser. 12, 7:925–933, 1 pl.

——— 1955. The fishes of Aldabra. Part I. Ann. Mag. Nat. Hist., ser. 12, 8:304–312, 1 pl.

——— and M. M. SMITH. 1963. The Fishes of the Seychelles. Dept. of Ichthyology, Rhodes University, Grahamstown. 215 pp., 98 pls.